Nam Theun 2 Power Company Ltd.

Nam Theun 2 Hydroelectric Project

Nakai Livelihood Implementation Plan Focus on Agriculture/Livestock

Option: Agriculture – Livestock – Forestry - Fisheries Integration

Rev	Date	Author	Checked	Approved	Modification Details
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Accessibility

- ☐ Public
- ☑ Internal
- ☐ Confidential

Document No.

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Acronyms and Abbreviations

AIP	Annual Implementation Plan
CA	Concession Agreement
COD	Commercial Operations Date
DAFO	District Agricultural and Forestry Office
DMC	Direct Seeding Mulch-Based Cropping Systems
NT2 or Project	Nam Theun 2 Project
NTPC	Nam Theun 2 Power Company Limited
NTFP	Non-Timber Forest Product
PAFO	Province Agricultural and Forestry Office
PM	Prime Minister
SDP	Social Development Plan

Table of Contents

1. INTRODUCTION

1.1. Background

This study comes after assessments of the feasibility of sustainable livelihoods on the Nakai Plateau following the village relocations necessitated by the Nam Theun 2 dam. The last assessment was carried out based on the experience gained in the pilot resettlement village and the IRAM study of January 2004. In addition, Messrs Julien, Raunet and Syphanravong produced a study of the agro-ecological potential of the area in June 2005.

From this information it seems that to expect sustainable farming on the 0.66 ha of land allocated per household is ambitious and risky for the long-term survival of resettled villagers. It is also apparent that the transition from extensive to highly intensive farming systems should be more gradual that was originally recommended in the Social Development Plan (SDP). This is especially the case given that:

a. Villagers on the Nakai Plateau have traditionally required some 60,000 ha of land to survive, using the most productive soils (near the Nam Theun River) on plateau;
b. Due to inundation of the Nakai Plateau, only some 20,000 ha will be left for the villagers to produce the same outputs on the poorer soils;
c. The skills base for highly intensive farming systems is not currently available on the plateau.

Accordingly, it has been proposed that integrated farming systems be further developed in the designated forest areas of the Nakai Plateau. Within its demarcated village boundary each village will own collective land where it can create semi-intensive farming systems (somewhere in between the current farming systems and the SDP-proposed intensive farming systems) using tried and proven techniques including DMC (direct seeding mulch-based cropping systems).

The mission completed by P. Julien in March 2006 was able to:

- Define the territorial limits of the 15 villages to be relocated on the Nakai Plateau according to their needs (based on the number of families in each village);
- Analyse the potential and the constraints dictated by the usable land resources and soil potential;
- Evaluate activities undertaken following the previous mission;
- Propose a scheme to develop and maximise the potential of these new territories in line with the capacity and constraints of each village in terms of diverse systems of production;
- Assess the ability of the current technical teams to implement these programmes and to propose supplementary methods that can be enacted through a development programme, taking into account the duration of the project (cycle management).

This March 2006 mission confirmed that considering the natural resources available and the proposed production systems, the original SDP design presents major risks. NTPC (Nam Theun 2 Power Company) has therefore requested development of an adaptive programme that takes the villages resources and boundaries into account. Mr Andre Chabanne and Mr Patrick Julien were hired to develop an option for an integrated livelihood programme jointly with NTPC (See Appendix 1).

1.2. Objectives

The main objective of this mission is to propose an alternative option for the Nakai Livelihood Implementation Plan, based on the integration of agriculture, livestock, forestry and fisheries. That is to say:

- To identify the technical information needed in relation to:
  - Re-allocation of village territory (delineation of areas for each production system within the village territory);
  - Conservation agriculture;
  - Vegetable growing plans;
  - Fruit trees;
  - Food and cash crops;
  - Agro-forestry;
  - Pastureland;
  - Cattle and small livestock (pigs, poultry and goats);
  - Marketing;
  - Commercialisation, supply, storage, processing;
  - Micro-credit.
- To prepare the overall technical and financial programme to be progressively elaborated with further permanent technical assistance;
- To propose a logical framework, action plan and timeline to facilitate follow-up and assessment;
- To evaluate the training needs of farmers and technicians and to propose an implementation schedule for the training component;
- To define institutional organisation and human resources, including relations with the District Resettlement Working Group and other government organisations, and coordination between the different livelihood components (agriculture, livestock, forestry and fisheries).

In addition, an emergency programme has been created for the 2006 cropping season. This programme shall be compared to the SDP approach to develop an understanding of what aspects need to be changed or re-orientated in the SDP approach. An analysis of the compensation for agriculture, livestock, forestry and fisheries has been made according to the previous SDP.

2. GENERAL OBJECTIVES

(See Appendix 2)

The construction and operation of the NT2 dam will result in impacts, both beneficial and adverse, to the biophysical, socio-economic, and cultural environments of the Project Area. On the Nakai Plateau, 1,149 households with approximately 6,340 persons will be relocated from 15 of 17 villages over the period 2005-07, due to the inundation required to create the reservoir.

General Objective of the SDP

The SDP proposes exploitation systems that integrate agriculture, livestock, forestry, fisheries and collection of Non-Timber Forest Products (NTFPs) within all the ecosystems of the relocation area. These exploitation systems will be established according to the following criteria: social sustainability (socially acceptable), economics (economically viable) and environment (environmentally responsible).

According to the Village Development Plans, an income target that includes cash and in-kind earnings has been defined for each resettled village. These targets are to be reached at the end of the Resettlement Implementation Period. According to *Concession Agreement Amendment 5, Schedule 4, Part 1, §1.2* each resettled village shall earn at least the greater of the following two options:

a. The current average rural income per person, multiplied by the number of persons in the village;
b. Kip 2,131,200, multiplied by the number of persons in the village (this being the equivalent of US$ 1,200 per household, using the exchange rate of Kip 9,800 = $1 with the average household size being 5.518 persons).

Land Reallocation

According to Decree No. 193/PM of 29 December 2000, the regulations for the establishment and operations of the Nakai Plateau Village Forestry Association (NPVFA) have been approved by the Ministry of Agriculture and Forestry (MAF) and authorised by the Governor of Khammouane Province. This establishes the NPVFA as a legal entity which will have sole rights to harvest and sell timber and NTFPs from the allocated forest, provided this is done in a sustainable manner. The main obligation of the NPVFA is sustainable forest management, which will be undertaken through planning, forest management, protection, and conservation activities. According to the MAF, in order to legally conduct a forestry business licenses are required for logging, sawmilling, and wood processing and furniture factories. The NPVFA has applied for and obtained all three licenses. Thus the villagers, in the form of the NPVFA, have the right to the resources of the forest - as long as they are properly managed - but not to the land itself.

The government is in the process of developing a legal instrument aimed at strengthening the previous PM Decrees 193 and 37 in order to ensure that:

a. The forest resources in the Resettlement Area are for the exclusive use and benefit of the resettled plateau villagers only;
b. Land allocation and use in the Resettlement Area is undertaken within a framework that guarantees resettled villagers have the primary right to land use, both currently and in the future;
c. Land titles will be issued for all housing and permanent agricultural land within one year of actually relocating, building new houses, or planting the first crop on the agriculture land. However, these titles will be issued with a caveat prohibiting the sale of such land within the eight to nine year resettlement period, unless otherwise adjudicated by the Grievance Committee;
d. The fisheries resource in the Nakai Reservoir is for the exclusive use of plateau villagers (and those currently fishing in the proposed inundation zone) until such time as it is proven that this resource is in excess of the requirement of the Nakai fishers or their descendents; and
e. Trading in the reservoir fisheries resources is to be conducted only by the authorised reservoir fishers (the resettled plateau villagers, reservoir area fishers, and their descendents).

All resettlement villages will need to make joint decisions about the management of community resources in the resettlement area. There is a need for inter-community decisions on all ecosystem management. This means that new community groups, structures and institutions need to be established, developed and strengthened. Herein lies an opportunity to empower women and other vulnerable individuals by including them in community management

and leadership. These management systems will be required at the village community level and at the level of the entire Resettlement Area. These various institutions are essential for ensuring the successful resettlement of villages into new locations and livelihood systems.

The goal of the Agriculture and Livestock Development Programme is to enable resettled households on the Nakai plateau to develop productive and sustainable agriculture and livestock production as a part of their livelihood system. This system will also include reservoir fisheries, commercial forestry and various non-farm or off-farm enterprises. The Resettlement Area, on the southern edge of the reservoir, is on generally poor soils and thus specific agricultural practises will be developed to ensure sustainable and economically feasible agriculture in the area.

The adoption of these new forms of sedentary agriculture (compared with the previous slash-and-burn cropping system) will take several seasons to fully occur and will require the introduction of new crops and breeds of livestock, soil mulching practises to improve land, increased use of agricultural inputs and the marketing of surplus produce. The vehicle for providing this support will be an enhanced and strengthened Nakai Plateau extension service that can sustain delivery of inputs and support services.

A Forest Management Plan will be developed by the NPVFA, assisted by DAFO, PAFO and NTPC Technical Assistance, and updated every five years. This plan will provide for the long-term management of the Resettlement Area forests and their timber and non-timber resources. In order to meet the forestry development objectives a set of planning principles - which have already guided the drafting of the NPVFA Articles of Association and will continue to be used in the management of Resettlement Area forest – will provide a basis for assessing the suitability and feasibility of planned actions. These proposed principles are as follows:

- Forest development and management by villagers, for villagers;
- Zoning and sustainable management of natural forests for timber production and other forest uses;
- Processing wood into timber, semi-finished and finished products;
- Support to individual village committee organisations;
- Planning and development of domesticated NTFPs where appropriate and financially feasible;
- Promotion of strategies and methodologies for controlled forest grazing;
- Forest plantation development with local species, if and where appropriate and financially feasible;
- Conservation of the resource base of wild NTFPs;
- Conservation of soils, water resources, biodiversity and scenery.

The proposed Reservoir Fisheries Development and Management Plan is based on (a) analysis of likely environmental conditions, and (b) comparative analyses of fish yields with other hydropower storage reservoirs and ongoing reservoir management practises in northeast Thailand and the Lao PDR. The overall rationale is to devise a reservoir management programme that can sustain itself by meeting all costs of production, provide secure income to entitled beneficiary fishing associations, and gradually improve the fish stock to ensure a stabilised production rate (1,000 – 2,000 tonnes/year) five to ten years after impoundment.

In addition to livelihood sources such as forestry, agriculture and other employment opportunities, reservoir fisheries will form an important option. In the resettled villages, reservoir fisheries will:

- Supply an important source of animal protein for household consumption;
- Contribute additional household cash income;
- Provide employment opportunities both in actual fisheries and fish trade.

3. SPECIFIC OBJECTIVES

Following the reports of the previous missions, it would seem necessary at the current stage of operations to define a specific framework of interventions for all the SDP components. This framework will revolve around the following three tenets:

- Anchor all development actions around local institutions;
- Integrate all works within the management of the project cycle;
- Creation of an overseeing management plan for all the development operations, with an integrated environmental approach.

3.1. Management of the Project Cycle

The management of the project cycle should be formalised through a global technical and financial programme for 2006-2012 under the management blueprint. A two-stage prioritisation of activities has already been envisaged:

- From 2006 to 2009, during the gradual resettlement of the villages: identification of potential and constraints, construction of an array of technical aid options and strengthening of technical and institutional capacity;
- From 2009 to 2012, the period for putting the technical choices of the farmers into practice: this phase is to achieve the socio-economic and environmental objectives already described.

Each year, a detailed technical and financial programme will be drawn up in accordance with the proposed overseeing management plan and any adjustments deemed necessary after on-going evaluation of activities. Regarding expertise, it would seem essential that a pilot team be created to provide follow-up support and to guarantee:

- The management of technical and financial programmes;
- Evaluation of the environmental impact of development actions;
- Cross-checking and confirmation of data;
- Coordination of the various programme components;
- Training programmes;
- Strengthening of institutional capacity;
- Capitalising on results;
- Support for the production of periodic reports;
- Communications.

3.2. Strengthening of Local Institutions

Development activities will need to be anchored within the framework of local institutions (in Villages, District and Province) to guarantee sustainability. Beyond the project cycle, one of NTPC's missions is to leave in place technical organisations at the village level, and at the District Agricultural and Forestry Office (DAFO) and the Provincial Agricultural and Forestry

Office (PAFO). These bodies must be able to function independently. It is thus imperative that NTPC immediately begins to gradually replace its own technical assistance teams with skilled capacity within these institutions. To achieve this, an operational partnership will be required to link all actors across their common programmes and objectives. Village structures, the DAFO and the PAFO will need to be able to progressively complete their human resource capacities through training made available in the context of these programmes.

In the short term, an inventory of existing human resources must be completed in order to enable identification of recruitment needs during reorganisation of the programme.

3.3. An Integrated Approach

Integration is a logical component of environmental preservation of ensuring complementarities among the proposed technical interventions. This technical assistance respects the criteria of social and economic sustainability by reinforcing the available human resources (labour force among families and technical services).

Land Allocation

General context: The first part of the land plan favoured for this integration, identification of the village territories, has already been realised. It took into account the quality of the soils, their distribution across the area, the number of families, the number of cows and buffalo they already hold, and the current environmental risks. In terms of compensation, optimisation of revenue, ensuring self-sufficiency in food, and responsibility for environmental management, it seems essential that more land is allocated to the relocated families than the 0.66 ha initially set out. This requirement was envisaged by the Concession Agreement (CA) (sec 4, Part 1, 15.1 (a):

- *"Subject to rainfed agriculture and pastoral systems being ecologically sustainable and productive, additional land in the Resettlement Area may be developed as agricultural and grazing land, and allocated to Resettlement households and their descendants, following participatory land and forest use planning processes.*
- *Subject to drawdown zone agricultural systems being ecologically sustainable and productive, additional land in the drawdown zone may be developed as agricultural and grazing land, and allocated to resettled households and their descendants, following participatory land and forest use planning processes."*

Objectives: The methodology concerning the land allocation component proposed by NTPC appears on the whole to be sound, but during 2006 priority should be awarded to the continuous boundary marking of all the village land so that, from the beginning, the newly-settled farmers can:

- See the land they will have;
- Devise their own strategies with regard to these new resources (forest, grazing land, cultivable land, fishing);
- Identify their requirements.

To gain as much backing as possible from the villagers for the proposed programmes, this spatial division of the land is essential even before starting the planned farming. This will make it possible to orient programmes adapted to the resources of each area of village land and to optimise technical assistance (NTPC – DAFO). The official boundaries of the new village land must serve as the legitimate framework for the subsequent awarding of title deeds to each

beneficiary family that will have access to all the ecosystems in the village land: forest (wood and non-ligneous products), natural grazing land and lakes (fishing).

The first objective is to confirm the official boundaries of every village territory and to award title of all necessary plots to each family within the period specified in Decree No. 193/PM of 29 December 2000 – a maximum of one year after resettlement of the families. This priority is even more urgent than conducting an evaluation of the territories and their possible uses (see Appendix 3).

Conservation Agriculture

Once the territories have been defined, one of the major environmental and socio-economic challenges will be to develop methods that allow conservation of natural resources (soil, water, biodiversity), while promoting sustainable agriculture (that is socially acceptable, economically viable and environmentally sound).

A pre-requisite to this will be restoring and conserving the physical, chemical and biological fertility of the soils. This is essential given the loss of the ecosystems previously exploited by these families: the very poor soils of the resettlement area will not allow these people to continue their traditional slash-and-burn method of production.

Soil management is the main integrating theme for all development actions made in agriculture, livestock, forestry, fisheries, infrastructure preservation, water quality and standard of life. Conservation agriculture based on management of soils, through the development of DMC systems is thus proposed (see Appendix 4).

These systems, which have already been successfully tested in Laos and many other countries, are mentioned in a Circular of the Cabinet of Ministers (554/CCM.DC, 21/04/2005) and a Ministerial Decrees Minister of Agriculture and Forestry (0372/DF.05, 11/05/2005) stating that their development should be encouraged in every province of the country (see Appendix 5).

Based on the agronomic recommendations of the 2005 report by Julien, Raunet and Syphanravong, certain farming models already suggested within the Project (e.g. terracing and gravity-fed irrigation) should be avoided. In short:

"*The soils in the western part of Nakai plain-depression display the following main constraints:*

- *extremely limited fertility;*
- *low organic matter content;*
- *this low 'fertility' is concentrated in the upper 10 cm of the soils ('organic' horizon);*
- *these soils should therefore be disturbed as little as possible in order to conserve this slender advantage: no burning of vegetation, no clearing with a bulldozer, no tillage and, in principle, no scraping to level the land into terraces*;

All terrace development and contouring with erosion control cordons is forbidden. The fragility of the soils cannot stand this and the labour costs and time are prohibitive."

The investment budget allocated for creation of terraces, including preparatory ploughing and maintenance, could be utilised to support the construction DMC systems and also to improve sprinkler irrigation systems.

The production systems have been designed around technology transfer that is as wide as possible across the different levels of intensification initially identified, given the knowledge of the farmers and the economic risks identified. In this approach, it would seem essential to emphasise mixed production units – agro-forestry-pastoral - with rainfed rice, the basis of all

production systems in Laos (for food self-sufficiency), and the raising of large ruminants strongly integrated in the current production systems on the Nakai Plateau. From these basics, other intensive or extensive cash-crop and small animal faming systems can be developed in order to optimise the available natural resources.

Current slash-and-burn practices, which thanks to the long fallow periods observed (10 to 15 years) restore and maintain soil fertility, cannot be reproduced due to the loss of land area. These will be replaced by DMC systems in which forage crops, thanks to their above- and below-ground biomass (with strong, deep roots), reproduce the natural regulatory functions of the forest's bio-geo-chemical cycles over a shorter time frame (two to three years). Moreover, these species contribute to income not only through their value as forages but also through sale of the seeds they produce. Such forage species can, in addition, be grown in association perennial crops such as fruit trees, rapid-growth multi-usage trees, firewood and construction species, and annual cash crops such as rubber and coffee. NTFPs can also be introduced into these systems in wetlands and on the valley bottoms.

Finally, all the drawdown areas could be profitably used by evolving the state of their soils through forages and fallow crops after the reservoir is filled.

General descriptions of the developmental approach follow below with a detailed description of activities.

3.4. Crop Production Systems

General Principles for Establishing Units

Soil management for crop production will be developed through DMC systems, with three main production units identified by previous missions:

- The 0.66 ha of irrigated fields awarded to each family is earmarked principally for market gardening in rotation with forage crops (to restore soil fertility), in association with fruit trees plus mixed woodland and pasture planting;
- 3 ha for rainfed staples (rice) combined with cash crops (soybeans, groundnuts) in rotation with forage crops (to restore soil fertility), plus mixed woodland and pasture planting;
- 5 ha of forage crops (to restore soil fertility) in areas of degraded forest, in association with partial regeneration of timber species and NTFPs plus mixed woodland and pasture planting.

Reallocation of land in the most favourable locations would enable development of an arable-forestry-pastoral system over an area of 8.66 ha per family. It should be assumed that 1.66 ha will be dedicated to market garden and staple (food self-sufficiency) production annually, an area compatible with the average labour force of each family (i.e. between two and three active workers).

Fertilisation policy will integrate both locally produced organic waste and necessary chemical products in order to correct the strong acidity and nutrient deficiencies recorded across the soils. Pesticides will also be introduced in a measured and careful approach (on soils that are covered and protected from erosion) with an emphasis on Integrated Pest Management.

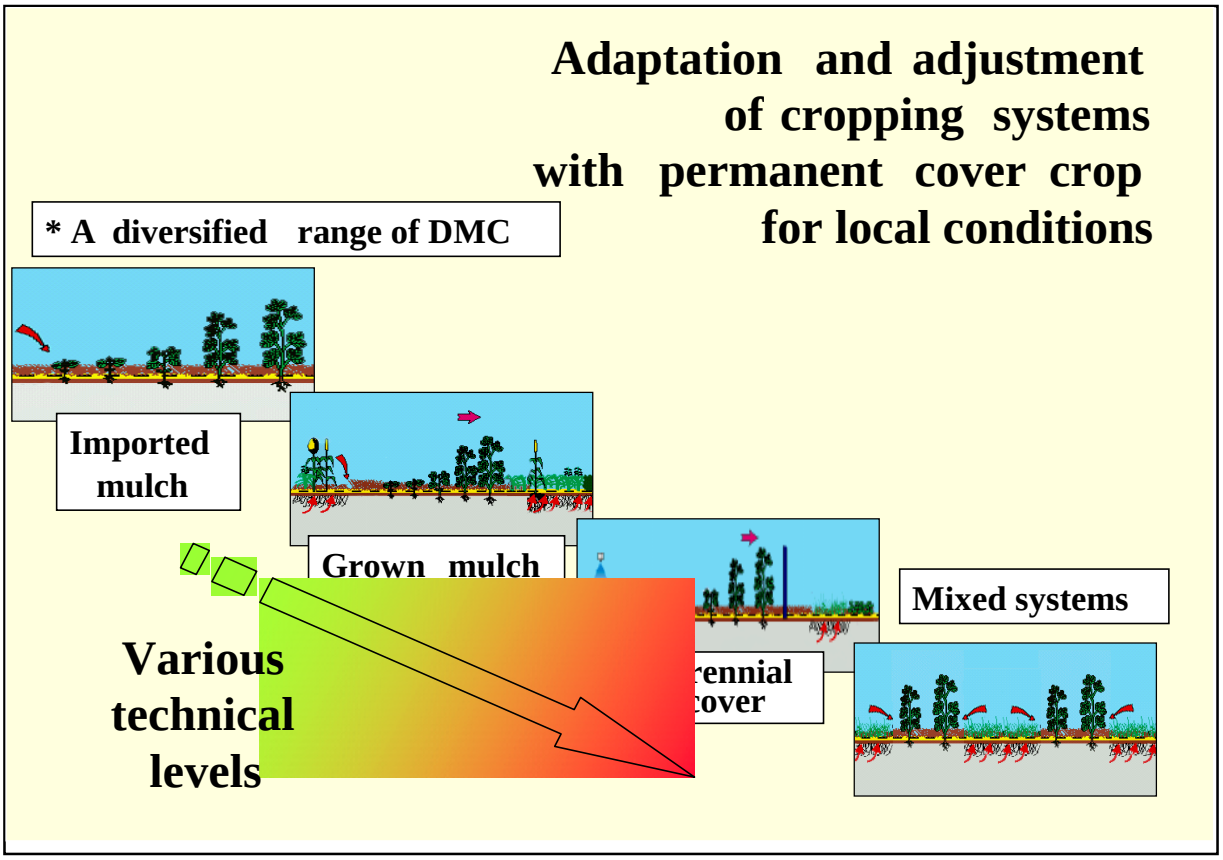
The studies already conducted have shown that all across the northern part and in some of the central part of the resettlement area it will be difficult, if not impossible, to provide the planned five hectares of forage crops. Moreover, in certain villages, it will also not be possible to

guarantee the three hectares required for staple crops (for details see P. Julien, *Village Boundaries and Mapping*, March 2006).

Principles of Establishing DMC: All cover crops planted must enhance the chemical properties of the soil, with reference first being made to tests in comparable ecological situations:
"The rate of sequestration of carbon in mulch-based cropping systems can be as rapid and as substantial as losses with inadequate management with or without tillage … The trends in the evolution of exchange capacity in the soil strictly follow those of organic matter. Mulch influences the saturation level of the upper horizons of the cultural profile.
'Brachiaria' type forage species grown for fairly long periods (3-4 years) play the role of 'cation pump' and strongly increase the saturation level of the (useful) surface horizons as if strong doses of lime-magnesium amendments had been applied." L. Seguy et al, *Système de culture et dynamique de la matiere organique*, 2001).

The different types of DMC systems that can be developed on the Nakai Plateau by Forest and Land Use Planning, Allocation and Management are as follows:

- **Imported biomass**: soil mulching for intensive vegetable crop systems (dead mulch) grown in irrigated fields;
- **Biomass produced in crop rotations** and broken down to provide mulch (dead mulch) for food cropping systems comprising cereals (rice and maize) or legumes (soybeans, beans);
- **Permanent live plant cover** for agroforestry, fruit, perennial industrial crops, etc. The live plant cover can be used as animal feed after two or three years;
- **Strips of live cover** providing mulch for cultivated strips **for all types of crop.**

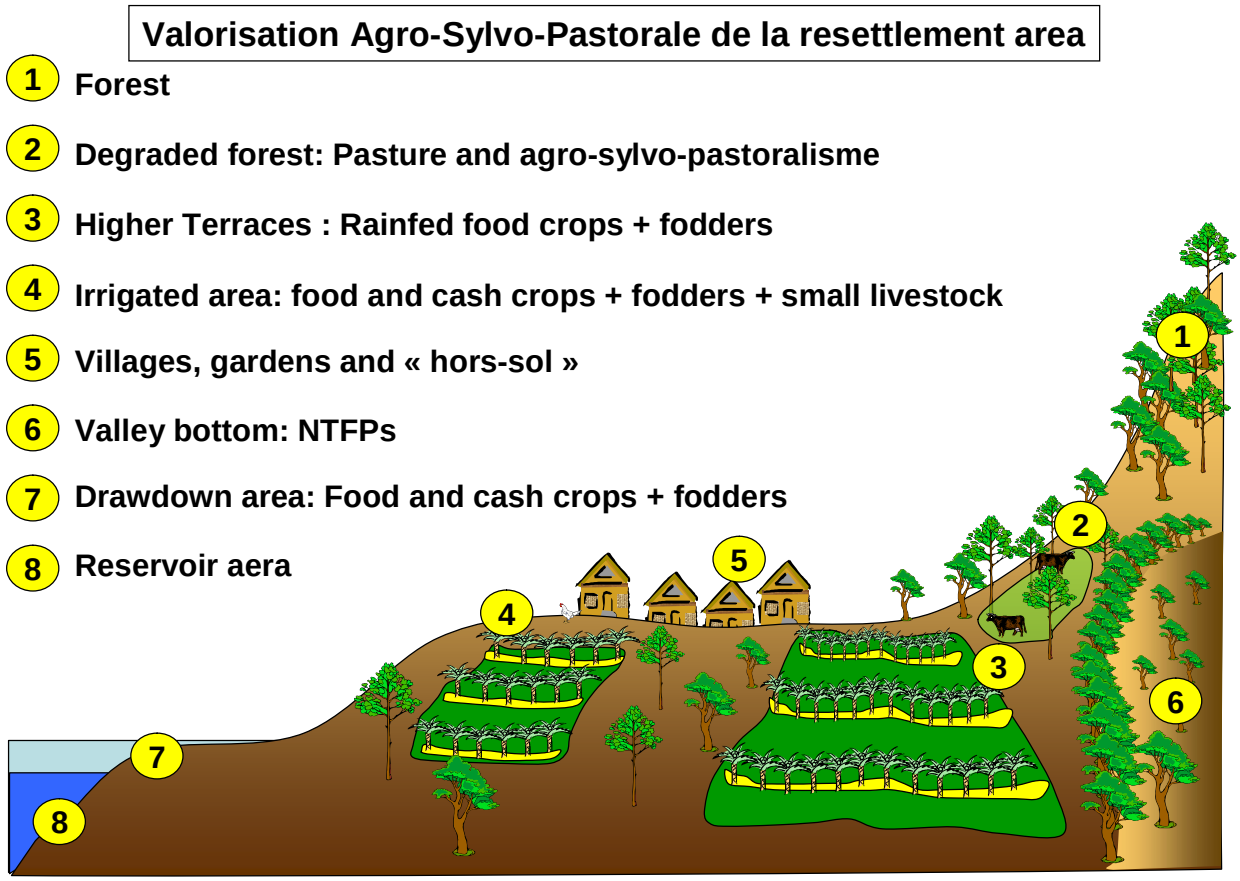


Principle of selective clearance, preservation then opening for rainfed rice: With all the proposed production systems, the allocated land is currently covered with fairly well established fallow that must be cleared in the following manner:

- Timber exploitation of valuable wood species (Forestry Programme);
- Clearance of scrub, with preservation of useful juvenile plants;
- Creation of swaths with clearance residue (the best of which can be used for firewood and stake-fences to enclose plots);
- Elimination of detritus by controlled fire (after sorting and swathing to salvage and preserve the useful), or by herbicide just before sowing of crops;
- Mineral and organic fertilisation immediately following the simultaneous sowing of rice and forages;
- Progressive mixed woodland and pasture planting of multi-usage species.

Restoring Fertility and Maintaining Mineral/Organic Content: Restorative fertilisation, through a combination of phosphates, calcites and trace elements, is required and will be applied using 600 kg/ha of thermophosphate (96 P_2O_5) during the first year and 400 kg/ha of maintaining fertilisers in subsequent years. In addition azotee (200 kg/ha of urea or 90 N) and potassic (100 kg/ha of KCl or 60 K_2O if formulated at 60%) stabilising fertilisers will be applied to crops. These doses should be adjusted according to species being grown, level of exportation, progressive improvement in the fertility of the soils and the quality of organic manure available locally.

General Plan for Establishment of Units



Management of Irrigated Fields

Area per family: 0.66 ha (irrigation to commence in June 2008).

Objectives: Establishment of market gardening and fruit production systems with mixed woodland and pasture planting of multi-usage species such as fire wood and timber species, forages, and forest cover.

Basic Principles: Semi-intensive conservation agriculture, with measured use of chemical inputs (fertiliser and pesticides) to complement locally-produced organic products, and optimisation of natural resources for transfer of fertility (manure, compost, stubble).

Initiation (Year 1): Enrichment of all the plots (0.66 ha) will be carried out through careful clearance and establishment of rainfed rice intercropped with forage crops.

Construction of Systems from Year 2:

- 50% of the area (0.33 ha) will be dedicated to market garden products that can continue throughout the year. If manpower is insufficient to farm 0.33 ha of market garden products, alternatives that are less labour intensive are available. Grain-based cash crops such as soybeans, groundnuts, haricot beans, Vigna species, Job's tears, maize, finger millet, and sorghum can be marketed or used as part of a livestock system.
- The other 50% of this land (0.33 ha) will be used for forage species needed to fix soil in the farming area and restore fertility (improved fallow). In addition to their value as forages, seed sales from these crops will assure some complementary revenue.
- Rotation every three years between market garden crops and forages.

Notes: If the irrigation is not up and running by the second year, these fields will be mainly used during the rainy season. Different crop cycles that require less water than market garden crops will be developed, i.e. grain or forage crops (soybeans, groundnuts, haricot beans, Vigna species, Job's tears, maize, sorghum, *bracharia*, finger millet, Pigeon pea and so on).

Following the cycles of these crops, other species (e.g. sorghum, *bracharia*, finger millet, Pigeon pea) may be intercropped at the end of the rainy season to produce grains and forages, and to replenish ground covering. Depending on labour availability, development of mixed woodland and pasture can progress.

Management of the Staple Crops Area

Area per family: Maximum 3 ha.

Objectives: Establishment of staple crop production along with fruit and agro-forestry-pastoral systems. Rainfed rice forms the current foundation of the production systems of all families, guaranteeing their food self-sufficiency. It is important to retain rainfed rice in the farming systems. The area reserved for this in the CA (0.16 ha of the irrigated area) is insufficient to satisfy the needs of all families. Thus it is necessary to ensure greater allocation of land, providing each family with 1 ha to farm through gradual implementation of mixed woodland and pasture with multi-use species (fire wood and timber species, forages, and fruit trees).

Basic Principles: Semi-intensive conservation agriculture, with measured use of chemical inputs (fertiliser and pesticides) to complement locally-produced organic products, and optimisation of natural resources for transfer of fertility (manure, compost, stubble); replacement of traditional

slash-and-burn systems – which are no longer feasible – with staple crop systems in rotation with forages (improved fallow, which reproduces the soil-improving effect of a forest over a shorter time).

Initiation (Year 1): Enrichment of all the plots (3 ha) will be carried out through careful clearance and establishment of rainfed rice (according to the needs and labour force within each family) with forage crops either intercropped with the rice or planted directly.

Construction of Systems from Year 2: One hectare of rainfed rice every year in a three-year rotation with 2 ha of forages which supply a feed crop and marketable seeds.

Notes: As soil fertility improves, leguminous grain cash crops (e.g. soybeans, groundnuts) can be integrated within the rotations. Depending on labour availability, development of mixed woodland and pasture can progress.

Management of the Pasture Area in Degraded Forest

Surface per family: Maximum 5 ha. An area this size is not available in eight of the villages, and a figure closer to 2 ha per family must suffice.

Objectives: Establishment of pasture systems for large ruminants - cows and buffalo – on degraded forest land and gradual implementation of mixed woodland and pasture with multi-use species (fire wood, cane and timber species, forages). These systems are able to support 0.6 to 1 large animals per ha, thus allowing three to four head if the planned 5 ha are available.

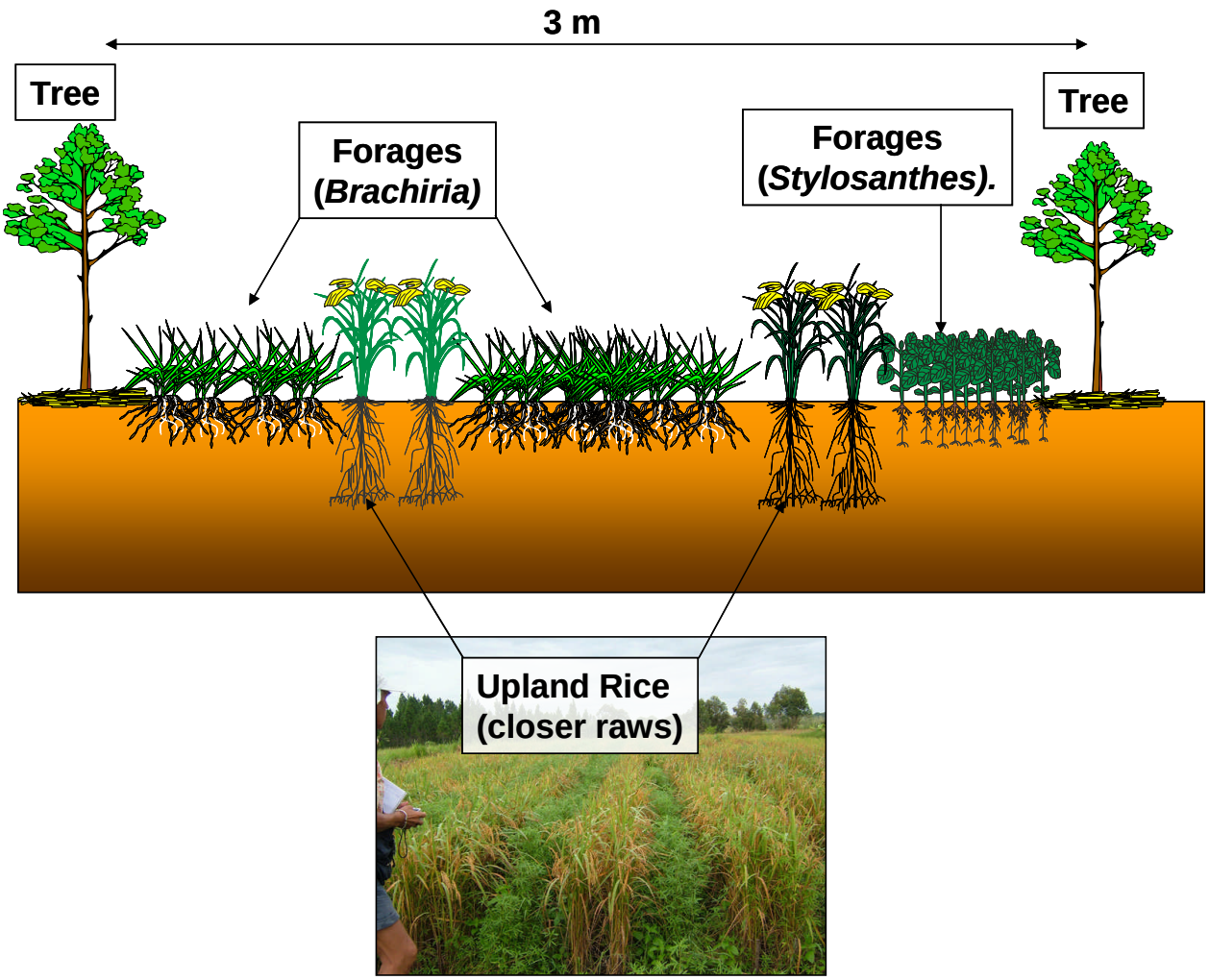
Basic Principles: Semi-intensive conservation agriculture, with measured use of chemical inputs (fertiliser and pesticides) to complement locally-produced organic products, and optimisation of natural resources for transfer of fertility (manure, compost, stubble).

Initiation (Year 1): Enrichment of all the plots (maximum 5 ha) will be carried out through careful clearance, potentially retaining 15-30% of the existing forest cover, followed by establishment of forage crops.

Construction of Systems from Year 2:
Designation of plots for:

- Revolving pasture;
- Cut and carry forages;
- Seed production.

Notes: These forest-pasture units will require the same restorative and maintenance fertilisation plan as the crop fields. Maintenance fertilisation can be gradually reduced as soil fertility improves through the forage cover and animal manure. Depending on labour availability, development of mixed woodland and pasture can be implemented progressively.



Valley Bottom Management

Management is needed to preserve variety of timber species and to increase the array of NTFPs. In all the locations where 'valley-bottom' ecologies are present in village territories, specific programmes are envisaged to enrich these well-drained and humid ecosystems through the domestication and cultivation of profitable NTFPs such as bastard cardamom, rattan and bombark.

Objectives: Identify the potential of these areas within the framework of the total allocated land areas (irrigated fields, staple crops and pastures); Design a programme for proliferation of NTFP species to be introduced within the Forestry Programme; Ensure promotion of these activities among the farmers on the allocated land. This programme could be developed through a special joint approach for the wider NTFP enrichment of the non-allocated forest areas (see Forestry Programme).

Basic Principles: Preserve forest cover in these fragile sources of biodiversity.

Drawdown Area Management

Prior to the reservoir being filled and becoming operational, it is difficult to predict what areas will become usable and through what kind of activities. It can, however, be envisaged that intercropping of short-cycle varieties (rice, maize, soybeans, market garden products) will be possible in addition to enrichment of these zones through forage species that are resistant to the flooding and which contribute to feeding ruminants.

Objectives: To introduce, during the 2006 season, a forage species (*Brachiaria mutica*) already present in Laos. This species, which could be collected from wetland areas on the plain of Vientiane, is able to survive underwater for several months. The plan is to test its introduction in flooded areas before planting it throughout the drawdown zones. For other crops, we must wait and see the definitive water level of the reservoir.

3.5. Livestock Systems

General Principles

Considering the major role of livestock in current production systems, and the constraints identified during this mission, it is necessary that the Agriculture and Livestock Team supplies the means of performing a rapid appraisal of the whole livestock component on the Nakai Plateau, including:

- A detailed inventory of the cattle;
- Their sanitation situation;
- The impact of herd reduction on family economies;
- Strategies for cattle farmers in their new conditions.

According to the last statistics supplied to the mission, which are not definitive, the current total number of cattle in the villages is 5,810 head. The supplied breakdown by age and sex was unclear and unusable. Analysis of the relocation area's potential revealed that it will be possible, with sound management of the resources, to accommodate 2,000 head of adult cattle, meaning that current herds will have to be reduced by over 60%.

Moreover, the SDP (and CA, Sec 4, Part 1, 15.1 (a) 6.2) committed the Project to supplying two head of cattle to families that currently have none and one head to those who presently own one to three animals (these include over 50% of all the families). In light of the constraints already mentioned, it is essential that other methods of compensation (goat, pig and poultry raising) are offered to villagers.

The Large Livestock component should receive as much attention as possible on account of the benefits it will bring in terms of fertility transfer, draught force and savings. It will require, however, intensification of the forage production systems, which will take time.

Identification of the starting point, which could be accomplished rapidly, would enable commencement of all support and vaccination measures specified in the SDP and would also allow all the following animal modules to be included in the programme. Starting with the three small animal units already in place at Agriculture Extension Centres, for pigs, poultry and frogs, and to which goats will be added, a development programme will be required to present to farmers. The first step is to retain current livestock systems and make it possible for them to be integrated into the resettlement area: large ruminants (cows and buffalo), goats, pigs, poultry and rabbits. Required assistance here will include construction of pens, water supply, and veterinary care.

Starting from these traditional systems and from a needs evaluation, more intensive systems can be established to suit the strategies and means of the farmers (i.e. workforce, income, land resources). These measured systems will need to be reproduced with large-scale intensification and technical knowledge.

They are to be integrated into the whole model on account of:

- The transfer of fertility to cultivated fields;
- Their ability to use the forage and grain production;
- Their recycling of by-products (e.g. rice bran);
- Draught animal power;
- Improvement of savings and financing capacity (source of immediate revenue);
- Nutritional balance (source of protein, calcium and vitamins).

Further diversification of animal production (frogs, fish-farming) will also be possible.

Large Ruminants

General context: 52% of farmers on the Nakai Plateau hold large ruminants (total of 5,810 head). Moreover, one of the programme's objectives is to donate two head of cattle to all families with no beasts and one to each family with less than three head.

Objectives:
To develop this component in a sustainable manner according to the available resources. In the proposed integrated development plan, only 2,150 head of adult can be supported. It is thus necessary to intensify practices, notably at the level of:

- Veterinary care and vaccinations;
- Supplementary feed;
- Herding;
- Genetic improvement;
- Improved pens, sheds and fences;
- Water quality and supply.

Cattle holding per family: Maximum of 0.6 adult beasts per ha of pasture in degraded forest.

Notes: Analysis of the Large Ruminants sub-component must be started as soon as possible so that a coherent programme can be designed.

Small Ruminants (Goats)

General context: This sub-component was not considered by the SDP but could yet be interesting for families that cannot or do not want to keep large ruminants, and for strengthening saving and financing capacities. It is also backed by information that there are already around 400 goats on the Nakai Plateau.

Objectives: This matter deserves development as it offers people the chance to create readily accessible avenues of supplementary income.

Notes: Analysis of the 'goats' sub-component should be initiated as soon as possible so that a coherent programme can be designed.

Small Animals (Pigs, Poultry and Rabbits)

General context: All these animals are present in existing extensive and traditional systems, supplying 25-30% of family income (source: *Pilot Village Assessment Report*, January 2005, F. Giovanetti).

Objectives:
To develop these sub-components in a sustainable manner according to the available resources. It is thus necessary to intensify practices, notably at the level of:

- Veterinary care and vaccinations;
- Supplementary feed;
- Herding;
- Genetic improvement;
- Improved pens, sheds and fences;
- Water quality and supply.

Notes: Analysis of these sub-components and of workshops run at Extension Centres should be initiated as soon as possible so that a coherent programme can be designed.

Other Small Animals (Frogs, Aquaculture)

General context: The only production units currently found are all in Extension Centres.

Objectives: Study of potential.

Notes: An agro-socio-economic evaluation of these systems is required. Considering the significant investments required, other production systems that are less costly may be preferred.

3.6. Villages, Homegardens and Off-Ground Production

House plot: 600 m²

Objectives:
In cooperation with the CD team, it will be possible to propose at village level:

- Integrated development of the house plot area:
  - With turfing of all individual plots (around the houses) and common areas (ditches and roadsides) in order to protect against erosion and to provide maximum control against all externalities (e.g. pollution);
  - Tree-planting of multi-usage species;
  - Introduction of fruit trees across the whole area;
  - Development of nurseries.
- Study of the possibility of integrating animal houses and the various infrastructure linked to livestock raising at village level, in terms of available land resources and public health;
- Education (introduction and training) in schools on home gardens, small animals, environmental protection and so on.

3.7. Forestry, Agroforestry and NTFPs

The government and NTPC completed the establishment of the Nakai Plateau Village Forestry Association (NPVFA) by an order of the governor of Khammouane Province on the 13th June 2002, to represent the combined interests of the affected persons in 15 villages. The association will enter into a Forest Management Contract with the government that requires a long-term Forest Management Plan. The association will be responsible for implementing the Forest Management Plan.
The main forest management goals (*Forest Management Plan for Nakai Plateau Resettlement Forest Area in Nakai District – Khammouane Province*, April 2005) are:

- *"Ensure the forests are managed on a sustainable basis for the long-term benefit of the local community and the Lao nation.*
- *Provide long-term income every year to affected families from various economic activities in forests including US$300 per year (in 2005 value terms) to each family in dividends and wages for timber harvesting and processing and forest management.*
- *Give guidelines for implementation of the plan to ensure business operations are profitable and proper compliance with government regulations.*
- *In better quality forest areas generate income from forest management with harvesting and processing of a minimum of 6,000 m^3 of logs annually. This income is needed to provide annual dividends and employment opportunities to resettled families, support community-based projects, and pay for the costs of wood production and community forest resource taxes.*
- *In forests that are degraded, undertake zoning and development for a range of uses, such as production forests with local species for timber and NTFPs, forest grazing, forage tree and grass crops and agroforestry.*
- *Self sufficiency in timber, fuel wood and NTFPs.*
- *Protection of watersheds, biodiversity and sites of scenic historic and cultural significance".*

The Forest Management Plan shows that, in the whole resettlement area (19,332 ha) the area of previously forested land is 15,640 ha. Only 1,331 ha is reserved for agricultural land and housing. According to the new reorientations for land resources compensation and land allocation (livestock grazing - 5 ha/family, rainfed crops - 3 ha/family) an additional 5,650 ha has to be found in is predominantly pine forest (9,183 ha).

With these "new reorientations", joint work between the Agriculture/Livestock and Forestry components has become necessary. Following demarcation of the territories, these teams must between them select the plots to be allocated as pasture and rainfed crop fields.

In addition, joint agro-forestry-pastoral programmes should be designed to conserve and associate multi-usage wood species in the staple crop systems (rainfed) and pastures. Regarding chosen plots, an inventory of resources will be conducted with the farmers to preserve the useful specimens and to plan diversification of wood species (mixed woodland plantation, anti-erosion hedges and so on).

Following are the main recommendations from the report *Domestication of Non-Timber Forest Products (NTFPs) in the Nakai-Nam Theun NBCA, Report on a Short Mission, 02 May to 01 June 2001*, by Joost Foppes:

- "NTFPs provide about 50% of family cash income;
- NTFPs provide a 'safety-net' survival function that should be safeguarded;
- Exceptional high local knowledge and use of NTFPs should be recorded and safeguarded;
- Mapping knowledge: basis for sustainable land use planning;
- Monitoring systems must be developed, based on local knowledge, by field teams;
- Project needs an action-research unit to guide and record the learning process;
- Create more interest in domestication by interest groups approach;
- Project cannot limit itself to improving supply; it must also work from the demand side;
- Project should test existing NTFP market analysing and development approaches;
- The Project needs a dedicated marketing support unit."

Drawing on these conclusions, a joint technical programming effort between the Agriculture / Livestock and Forestry components is required for NTFPs. As a priority, there is a need to evaluate the risks of disappearance or extreme rarity for certain resource species present in the reservoir. Plans are required for their possible readaptation in the wetland zones (valley bottom) of the resettlement area. The main concerns lie with bastard cardamom, rattan, and bamboo. Initial research on this should be carried out with species that have already been domesticated, to study their conservation and relocation into other areas.

3.8. Fisheries

The Fisheries component has yet to be established. Over the three years it will take for the dam to fill, it will be possible to design a technical and financial programme which can be integrated with other livelihood components. A support mission could be scheduled for the second half of 2006. Such a mission would provide a blueprint for integrating this resource into the proposed environmental option and would also give an idea of the human resources required to recruit and train technical teams to kick-start the planned activities.

3.9. Development Support

The General Context

Regarding organisation of the technical teams, it will be necessary to create operational sub-groups for the following tasks:

- Land allocation;
- Credit, in relation with the Community Development team;
- Supply, collection and marketing;
- Agricultural machinery, storage and processing of products;
- Health and diet of animals, livestock buildings;
- Creation and transfer of technical skills for and among farmers;
- Training of farmers, technicians and officials;
- Diffusion of innovations.

Analysis of the existing resources would allow a rapid evaluation of complementary needs, as well as the external training and support required to initiate diverse systems of production (Creation – Training – Diffusion) and the creation of a favourable professional environment (land, credit, professional structuring, infrastructure and material).

Creation – Training - Diffusion

General context: The idea is to create a favourable environment for diffusion through three operational sub-groups that will be responsible for creating production systems, training for technical teams and farmers, and support for diffusion.

Objectives:

- Participation in the Agriculture Development Programme,
- Setting up the apparatus for Creation-Training-Diffusion for and among farmers;
- Access to technical training and suitably trained livelihood extension staff to directly support the adoption of their new livelihoods;
- Access to training in new farming techniques and all other training provided;
- Agricultural advice until the end of the resettlement implementation period.

Professional Structuring

General context: In the project dynamic, compensatory measures were foreseen to accompany the creation of production systems for the duration of the Project, with a gradual reduction in the role of these interventions. They will cease at the end of the implementation phase (2012). This eventuality poses risks for the viability of the proposed production systems. It is thus essential, from the beginning, that support structures are in place for production.

Objectives: In all production sectors, actions are planned for:

- Credit;
- Supply (water, inputs, small agricultural tools, cattle, construction materials);
- Collection;
- Processing;
- Marketing of products.

It will be necessary, over the course of the first three years, to set up programmes that pass control of these activities to:

- Village communities;
- Traders;
- Banks (micro-credit);
- DAFO teams (support and extension services).

In addition to this programme, professional structures should be able to emerge and disappear in the natural economic context of the Lao PDR.

Infrastructure and Machinery

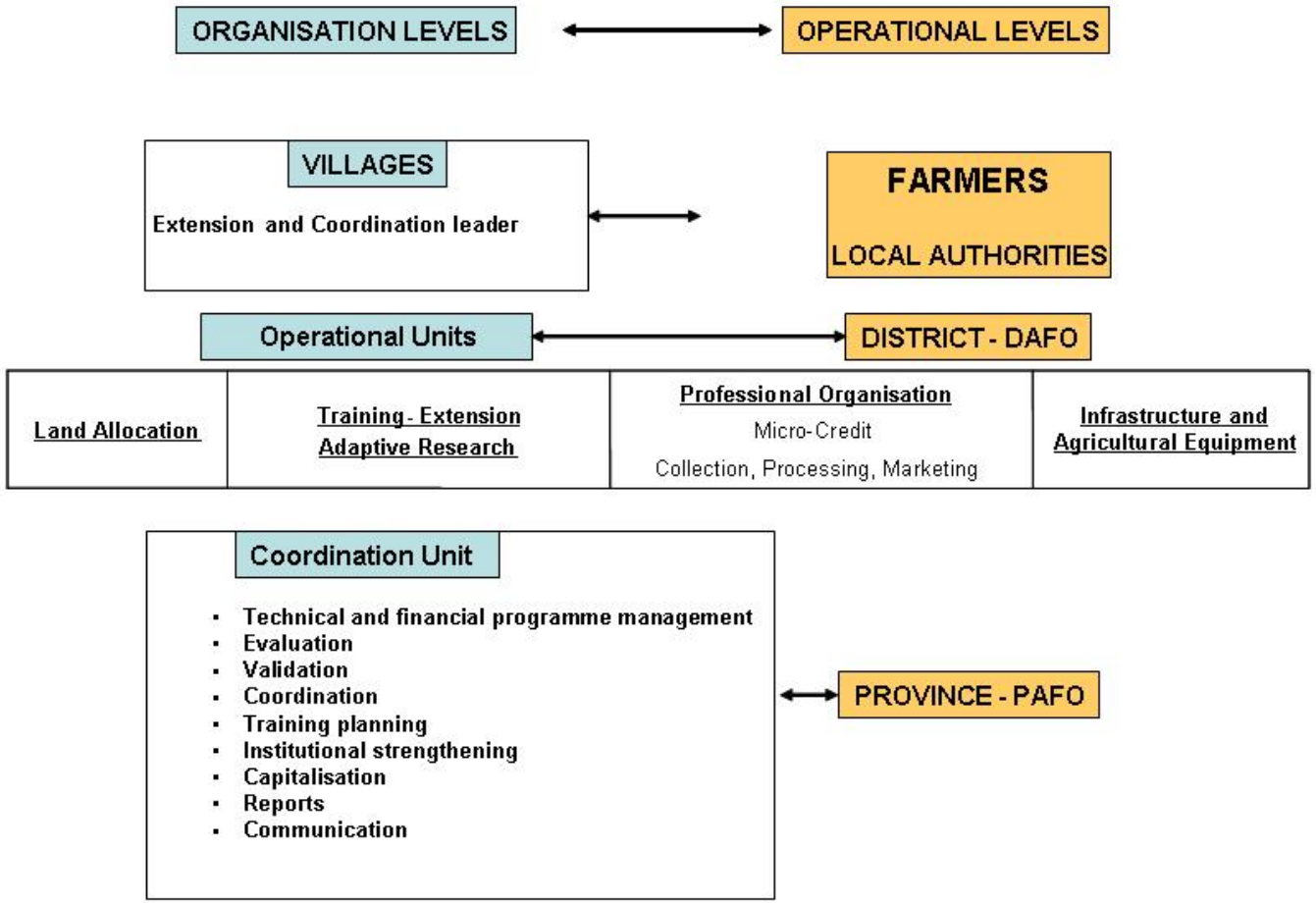
General context: Also set out in the CA are compensatory measures in terms of infrastructure (e.g. warehouse, rice mill, workshop, seed processing and storage facilities, organic fertiliser factories, cattle yard and crush, irrigation scheme, fences) and agricultural equipment (e.g. power tiller, maize huller, hammermill, forage chopper, oil press).

Objectives:

- Objective analysis of the pertinence of compensatory measures detailed in the CA;
- If necessary, readjustment of these measures.

4. GENERAL INTERVENTION FRAMEWORK

Within the framework of the programme, the following organisational map is proposed for the required sub-groups:



Logical Framework

GENERAL OBJECTIVES	SPECIFIC OBJECTIVES	ACTIVITIES
Resettlement • Land allocation • Compensation • Family Income Target Sustainable Agriculture: • Social • Economy • Environment • Ethics	Project Cycle Management	**1. Institutional Structuring** • Establish partnerships with DWG, PAFO, DAFO, and village authorities and organisations • Set up sub-groups for piloting and follow up • Evaluation **2. Management Blueprint** * 2006-2009 –Relocation of families : • Identification of constraints and potential • Design of assistance • Capacity strengthening * 2009-2012 : • Implementation of technical choices to accomplish objectives • Independence of local institutions
	Land Allocation	**3. Land Approach** (Mapping and demarcation, land titling for villages and families; dealing with land rights issues)
	Conservation Agriculture	**4. Establishing Integrated Production Systems** • Crop production • Animal husbandry • Forestry links • (Fishery links) **5. Development Support** • Credit (CD) • Supply, collection, marketing • Machinery, storage, processing • Animal health and nutrition, and buildings • Diffusion support

5. ACTIVITIES

5.1. Activity 1: Institutional Structuring

Actions	Operations	
Establish partnerships with DWG, PAFO, DAFO, and village authorities and organisations	Structuring technical teams	Evaluation of current partnership efficiency Preparation of partnership agreement with DAFO/PAFO Negotiation with all partners Formal agreement (workshop)
	Intervention methodology for village organisations	Evaluation of current status of village organisations Definition of role of technical teams in supporting village organisations Joint evaluation of actions Steering
Set up sub-groups for piloting and follow up		Evaluation of current role
		Proposals for role of sub-groups in piloting and follow up
		Appraisal by all partners (workshop)
Joint evaluation of partnership efficiency		Annual workshop

5.2. Activity 2: Project Cycle Management

Blueprint for piloting and follow-up sub-group

Actions	Operations
Evaluation of human resources	Evaluation of existing human resources Evaluation of complementary needs
Evaluation of equipment needed	Inventory of current resources Inventory of complementary needs
Evaluation of technical assistance required	ToR of permanent technical assistance TDR of support missions
Structuring Project technical team into operational sub-groups	Setting up operational sub-groups
Training	Evaluation of training requirements and trainer supports Identification of partners and staff resources Programming and execution of training
Technical and financial programming	Evaluation of underway technical and financial programming; analysis of constraints and synergies in relation to CA objectives Programming support from operational sub-group Appraisal of annual technical and financial programmes (AIP) Coordination and implementation of technical and financial programmes
Annual evaluation of development actions	Agro-socio-economic evaluation of spread of technical innovations each village Environmental evaluation Evaluation of organisational roles put in place Budgetary evaluation Evaluation of diffusion of innovations Synthesis and reorientation of programmes

Actions	Operations
Activity reports and amendments	Appraisal and agreement on data Capitalising on results Support to production of monthly and annual reports by operational sub-groups Production of semi-annual synthesis reports Review workshop with all technical, financial and political partners
External and internal communication	Fulfilment of all communication requirements from NTPC communications team Publication of regular newsletter

5.3. Activity 3: Land Allocation

Actions	Operations
Learning from land rights issues (CD)	Presentation of land reallocation plan outlining the 0.66 ha plots and the territory approach
	Presentation of the possibilities for using the reservoir area
	Environmental impact assessment for the first new villages
	Presentation of risks to agricultural and technical manipulation of the soil
Demarcation and allocation of territories across the whole resettlement area (20,000 ha)	Morpho-pedological mapping (soil aptitudes) Provisional mapping of territories Inventory of cultivable surfaces on each territory by soil type Appraisal by villages Definitive mapping and demarcation by village Titling by village
Demarcation and allocation of territories by family	Mapping of usage plan by soils Joint preliminary identification (A/L – Forest – Villages) of most appropriate land resources Appraisal in each village Definitive mapping and demarcation by family Titling by family

5.4. Activity 4: Establishing Integrated Production Systems

Crop Systems

Actions		Operations
Transition phase before establishment of systems	Clearance of Reservoir area: oriented towards extensive production of rainfed rice during the resettlement phase along with Reservoir Salvage Logging	Charcoal and valuable species extraction Slash-and-burn Growing rainfed rice
Irrigated area systems	Programming	Technical and financial programming Determination of inputs required Agro-socio-economic evaluation of systems Identification of specific training needs Programming and giving of training Marketing support Field trips Activity reports Integration of results
	Preparation (year 1)	Selective and conservatory clearance Restoration of soils chemical fertility Rainfed rice growing Establishing forage crops
	Systems establishment	Set up and management of market gardening and fruit systems Management and exportation of forage crops Mixed woodland multi-usage species Water management (irrigation systems) Creating water-users' associations (CD) Set up and management of demonstration plots Diffusion support
	Diversification (market garden species and varieties)	Introduction of varieties Evaluation of varieties Validation Proliferation (seeds, plants, cuttings)
	Unavailable irrigation systems	Establishment and management of staple and cash crops

Actions		Operations
Staple crop production zone systems	Programming	Technical and financial programming
		Determination of inputs required
		Agro-socio-economic evaluation of systems
		Identification of specific training needs
		Programming and giving of training
		Marketing support
		Field trips
		Activity reports
		Integration of results
	Preparation (year 1)	Selective and conservatory clearance
		Restoration of soils chemical fertility
		Rainfed rice growing
		Establishing forage crops
	Systems establishment	Set up and management of rainfed rice systems
		Management and exportation of forage crops
		Mixed woodland multi-usage species
		Set up and management of demonstration plots
		Diffusion support
	Diversification of species (leguminous grains, fruit) and varieties (rainfed rice)	Introduction of varieties
		Evaluation of varieties
		Validation
		Proliferation (seeds, plants, cuttings)
	Depending on fertility restoration	Integration of leguminous grains into rotations

Actions		Operations
Pasture in degraded forest zone systems	Programming	Technical and financial programming
		Determination of inputs required
		Agro-socio-economic evaluation of systems
		Identification of specific training needs
		Programming and giving of training
		Marketing support
		Field trips
		Activity reports
		Integration of results
	Preparation (year 1)	Selective and conservatory clearance
		Restoration of soils chemical fertility
		Establishing forage crops
	Systems establishment	Management and exportation of forage crops
		Set up and management of demonstration plots
		Progressive mixed woodland and pasture planting
		Agro-forestry-pastoral management (Forestry team)
		Diffusion support
	Diversification of forage species	Introduction and collection of varieties
		Evaluation of varieties
		Validation
		Proliferation (seeds, plants, cuttings)
Valley Bottom area systems	NTFPs (Forestry team)	Inventory of potential (surfaces)
		Establishing a domestication programme
		Establishing a proliferation programme
		Promotion to farmers
Drawdown area systems		Short-cycle crop intercropping
		Planting of *Brachiaria mutica*
	Diversification of forage, staple and cash crop species	Introduction of varieties
		Evaluation of varieties
		Validation
		Proliferation (seeds, plants, cuttings)

Establishing Animal Production Systems

Actions		Operations
Large ruminants (cows and buffalo)	Preparatory phase	Construction of stock-yard
		Define positioning of necessary infrastructure
		Survey and inventory of cattle per family and per village
		Vaccination of all cattle
	Programming	Technical and financial programming
		Determination of inputs required
		Follow up on technical and economic performance
		Identification of specific training needs
		Creation of technical files
		Programming and giving of training
		Marketing support
		Field trips
		Activity reports
		Integration of results
	Herd management	Specification of nutrition plans
		Genetic improvement of cows
		Tracking and management of herd fertility
		Tracking and management of knowledge of animals
		Tracking health
		Tracking and management of fertility transfer
		Management of cattle and animal sales
Small ruminants (goats)		Survey and inventory of animals per family and per village
		Technical programme specification
Small animals (pigs, poultry and rabbits)		Survey and inventory of animals per family and per village
		Technical programme specification
Other small animals (frogs, aquaculture)		Study

5.5. Activity 5: Development Support

Actions	Operations
Creation – Training - Diffusion	Analysis of initially-proposed systems
	Evaluation of Extension Centres performance
	Definition of a Research & Development programme
	Set up of Creation – Training - Diffusion network
Professional structuring	Global survey
	Programme design
Infrastructure and machinery	Global survey
	Programme design

6. MONITORING AND EVALUATION

A piloting tool is to be created through proposed the pilot sub-groups and Monitoring-Evaluation. This tool concerns:

- Follow up of the development and programmes structures;
- Budgetary follow up;
- Follow up of the agro-socio-economic and environmental impact of the proposed production systems.

This will allow:

- Technical and financial management within programme real-time;
- Orientation of actions and validation of innovations;
- Capitalising on experience;
- Informing of all development partners: farmers, village organisations, technical development agents, Project management, backers and the government.

At the current stage of programming, it is not possible to design this Monitoring-Evaluation tool in detail. It will progressively take form over the course of 2006 in response to:

- Validation of the proposed programmes;
- The institutional setting;
- Preliminary evaluations of actions already undertaken.

The following table lists the expected activities and actions. It will be gradually completed over 2006.
Appendix 6 provides examples from a Monitoring-Evaluation matrix (cf. P. Julien, F. Jullien, PASS, Sayaboury, F. Tivet 2005).

ACTIVITIES/ACTIONS		ACTIVITY INDICATORS	RESULT INDICATORS
Activity 1: Institutional Structuring			
	Establishment of partnerships with DWG, PAFO, DAFO, authorities and village organisations		
	Set up of pilot sub-groups and Monitoring-Evaluation		
	Joint evaluation of partnership performance		
Activity 2: Project Cycle Management			
	Human resource evaluation		
	Equipment needs evaluation		
	Technical assistance needs evaluation		
	Structuring of Project technical team around operational sub-groups		
	Training		
	Technical and financial programming		
	Annual evaluation of development actions		
	Reports and response to activities		
	External and internal communication		
Activity 3: Land Allocation			
	Discussion of land rights issues (CD)		
	Demarcation and allocation of territory for the whole resettlement area (20,000 ha)		
	Demarcation and allocation of family territory		

ACTIVITIES/ACTIONS		ACTIVITY INDICATORS	RESULT INDICATORS
Activity 4: Set up of Crop Production Systems			
	Transitory phase before construction of systems		
	Irrigated area systems		
	Staple crop production systems		
	Pasture systems in degraded forests		
	Systems for valley bottom areas		
	Systems for drawdown areas		
Activity 4: Set up of Animal Production Systems			
	Large ruminants (cows and buffalo)		
	Small ruminants (goats)		
	Small animals (pigs, poultry and rabbits)		
	Other small animals (frogs, aquaculture)		
Activity 5: Development Support			
	Creation – Training - Diffusion		
	Professional structuring		
	Infrastructure and machinery		

7. BUDGET

At the current stage of programming, it is not possible to finalise the budget. Following is a table of general rubrics that are to be taken into account. This table is to be gradually completed over the course of 2006 as programming advances.

This budget will be accompanied by a simple accounting system (banking and cash flow books) to allow daily monitoring of activities, expenditure and stock levels. It will also allow the creation of monthly financial reports.

Recorded in a spreadsheet form these tables provide:

- A summary of expenses by budget line and by month;
- Six-monthly and annual summaries;
- Financial monitoring by sub-group and by type of activity.

Dollars	Unit	Total 2006		Total 2007		Total 2008		Total 2009		Total		Source		
	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	Backer 1	Backer 2	Backer 3
1 Investments														
1.1 Cars														
1.2 Motorbikes														
1.3 Office materials and furniture														
1.4 Agricultural machinery														
1.5 Training and research materials														
Sub-total investment														
2 Personnel														
2.1 Salaries														
2.2 Premiums and insurance														
2.3 Incentives														
2.4 Technical assistance														
Sub-total Personnel														
3 Activities														
Activity 1: Institutional structuring														
Establishing partnerships			-		-		-		-		-			
Set up of pilot sub-groups and monitoring-evaluation														
Joint evaluation of performance														

	Activity 2: Project cycle management			-		-		-		-		-	
	Human resource evaluation												
	Equipment needs evaluation												
	Technical assistance needs evaluation												
	Structuring of technical team												
	Training												
	Technical and financial programming												
	Annual evaluation of development actions												
	Reports and response to activities												
	External and internal communications												
	Activity 3: Land allocation												
	Discussion of land-rights issues (CD)												
	Demarcation and allocation of territories												
	Demarcation and allocation of territories by family												
	Activity 4: Establishing crop productions systems												
	Transitory phase before construction of systems												
	Systems for irrigated area												
	Systems for staple crops areas												
	Systems for pasture in degraded forest												
	Systems for valley bottom areas												
	Systems for drawdown areas												
	Activity 4: Establishing animal production systems												
	Large ruminants (cows and buffalo)												
	Small ruminants (goats)												
	Small animals (pigs, poultry, and rabbits)												
	Other small animals (frogs, aquaculture)												
	Activity 5: Development support												
	Creation – Training - Diffusion												
	Professional structuring												
	Infrastructure and machinery												
	Sub-total Activities												
4	**General operations**												
	4.1 Vehicles												

4.2 Office												
4.3 Sundries												
Sub-total General Operations												
5 Monitoring-Evaluation												
Sub-total Monitoring-Evaluation												
6 Training												
Sub-total Training												
7 Outside technical support												
Sub-total Outside technical support												
8 Communication and future development												
Sub-total Communication and future development												
TOTAL												

8. SCHEDULE OF ACTIVITIES

Activities/Actions/Operations	2006												2007											
Activity 1: Institutional structuring	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Establishing partnerships with DWG, PAFO, DAFO, and village organisations																								
Structuring technical teams																								
Evaluation of current partnership performance																								
Preparing partnership contract with DAFO/PAFO																								
Negotiation with all partners																								
Formalisation of agreement (workshop)																								
Intervention methodology for village structures																								
Evaluation of current village structures performance																								
Defining performance of technical teams in support to village structures																								
Set up of pilot sub-groups and monitoring-evaluation																								
Joint evaluation of actions																								
Steering																								
Evaluation of current performance																								
Improving performance of pilot sub-groups and monitoring-evaluation																								
Validation by all partners (workshop)																								
Joint evaluation of partnership performance																								
Annual workshop																								

Activity 2: Project cycle management – Elaboration of blueprint	2006												2007											
	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Human resources evaluation																								
Existing human resources evaluation																								
Evaluation of complementary needs																								
Evaluation of needs en teamment																								
Inventory of present resources																								
Inventory of complementary needs																								
Evaluation of technical assistance required																								
TDR of permanent technical assistance																								
TDR of support missions																								
Structuring Project technical team into operational sub-groups																								
Setting up operational sub-groups																								
Training																								
Evaluation of training requirements and trainer supports																								
Identification of partners and staff resources																								
Identification of partners and staff resources																								
Technical and financial programming																								
Evaluation of underway technical and financial programming																								
Programming support from operational sub-group																								
Appraisal of annual technical and financial programmes (AIP)																								
Coordination and implementation of technical and financial programmes																								
Annual evaluation of development actions																								
Agro-socio-economic evaluation of spread of technical innovations each village																								
Environmental evaluation																								
Evaluation of organisational roles put in place																								
Budgetary evaluation																								
Evaluation of diffusion of innovations																								
Synthesis and reorientation of programmes																								
Activity reports and amendments																								
Appraisal and agreement on data																								
Capitalising on results																								
Support to production of monthly and annual reports by operational sub-groups																								
Production of semi-annual synthesis reports																								
Review workshop with all technical, financial and political partners																								
External and internal communication																								
Fulfilment of all communication requirements from NTPC communications team																								
Publication of regular newsletter																								

Activity 3: Land Allocation	2006												2007											
	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Learning from land rights issues (CD)																								
Presentation of land reallocation plan outlining the 0.66 ha plots and the territory approach																								
Presentation of the possibilities for using the reservoir area																								
Environmental impact assessment for the first new villages																								
Presentation of risks to agricultural and technical manipulation of the soil																								
Demarcation and allocation of territories across the whole resettlement area (20,000 ha)																								
Morpho-pedological mapping (soil aptitudes)																								
Provisional mapping of territories																								
Inventory of cultivable surfaces on each territory by soil type																								
Appraisal by villages																								
Demarcation and allocation of territories by family																								
Definitive mapping and demarcation by village																								
Titling by village																								
Mapping of usage plan by soils																								
Joint preliminary identification (A/L – Forest – Villages) of most appropriate land resources																								
Appraisal in each village																								
Definitive mapping and demarcation by family																								
Titling by family																								

Activity 4: Establishing integrated production systems	2006												2007											
	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Establishing crop production systems																								
Transitory phase before construction of systems																								
Slash-and-burn																								
Charcoal and valuable species extraction																								
Growing rainfed rice																								
Irrigated area																								
Technical and financial programming																								
Determination of inputs required																								
Agro-socio-economic evaluation of systems																								
Identification of specific training needs																								
Programming and giving of training																								
Marketing support																								
Field trips																								
Activity reports																								
Integration of results																								
Selective and conservatory clearance																								
Restoration of soils chemical fertility																								
Rainfed rice growing																								
Establishing forage crops																								
Set up and management of market gardening and fruit systems																								
Management and exportation of forage crops																								
Mixed woodland multi-usage species																								
Water management (irrigation systems)																								
Creating water-users' associations (CD)																								
Set up and management of demonstration plots																								
Diffusion support																								
Introduction of varieties																								
Evaluation of varieties																								
Validation																								
Proliferation (seeds, plants, cuttings)																								
Establishment and management of staple and cash crops (without irrigation)																								

Staple crop production zone systems																								
Technical and financial programming																								
Determination of inputs required																								
Agro-socio-economic evaluation of systems																								
Identification of specific training needs																								
Programming and giving of training																								
Marketing support																								
Field trips																								
Activity reports																								
Integration of results																								
Selective and conservatory clearance																								
Restoration of soils chemical fertility																								
Rainfed rice growing																								
Establishing forage crops																								
Set up and management of rainfed rice systems																								
Management and exportation of forage crops																								
Mixed woodland multi-usage species																								
Set up and management of demonstration plots																								
Diffusion support																								
Introduction of varieties																								
Evaluation of varieties																								
Validation																								
Proliferation (seeds, plants, cuttings)																								
Integration of leguminous grains into rotations depending on improving soil fertility																								

Pasture in degraded forest zone systems
Technical and financial programming
Determination of inputs required
Agro-socio-economic evaluation of systems
Identification of specific training needs
Programming and giving of training
Marketing support
Field trips
Activity reports
Integration of results
Selective and conservatory clearance
Restoration of soils chemical fertility
Establishing forage crops
Management and exportation of forage crops
Set up and management of demonstration plots
Progressive mixed woodland and pasture planting
Agro-forestry-pastoral management (Forestry team)
Diffusion support
Introduction and collection of varieties
Evaluation of varieties
Validation
Proliferation (seeds, plants, cuttings)
Valley bottom areas
Inventory of potential (surfaces)
Establishing a domestication programme
Establishing a proliferation programme
Promotion to farmers
Drawdown areas
Short-cycle crop intercropping
Planting of *Brachiaria mutica*
Introduction of varieties
Evaluation of varieties
Validation
Proliferation (seeds, plants, cuttings)

Activity 4: Establishing integrated production systems	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Establishing Animal Production Systems																								
Large ruminants (cows and buffalo)																								
Construction of stock-yard																								
Define positioning of necessary infrastructure																								
Survey and inventory of cattle per family and per village																								
Vaccination of all cattle																								
Technical and financial programming																								
Determination of inputs required																								
Follow up on technical and economic performance																								
Identification of specific training needs																								
Creation of technical files																								
Programming and giving of training																								
Marketing support																								
Field trips																								
Activity reports																								
Integration of results																								
Specification of nutrition plans																								
Genetic improvement of cows																								
Tracking and management of herd fertility																								
Tracking and management of knowledge of animals																								
Tracking health																								
Tracking and management of fertility transfer																								
Management of cattle and animal sales																								
Small ruminants (goats)																								
Survey and inventory of animals per family and per village																								
Technical programme specification																								
Small animals (Pigs, poultry and rabbits)																								
Survey and inventory of animals per family and per village																								
Technical programme specification																								
Other small animals (frogs, aquaculture)																								
Study																								

	2006												2007											
Activity 5: Development Support	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc	Jn	Fv	Mr	Ap	Ma	Ju	Jl	Au	St	Oc	Nv	Dc
Creation – Training - Diffusion																								
Analysis of initially-proposed systems																								
Evaluation of Extension Centres performance																								
Definition of a Research & Development programme																								
Set up of Creation – Training - Diffusion network																								
Professional structuring																								
Global survey																								
Programme design																								
Infrastructure and machinery																								
Global survey																								
Programme design																								

9. 2006 PROGRAMME

According to the situation of the programme at the beginning of this wet season, we propose hereby a fast track programme as following to preserve the future of the project. This fast track programme is a priority.

- Validation of programmes;
- Land and village boundaries workshop;
- Environmental impact assessment for first resettlements;
- Reservoir and clearance (slash-and-burn 2006-2009);
- Soil survey on the new irrigated area and eventual identification of new plots;
- Institutional setting;
- Livestock survey;
- Evaluation of human and material situation – recruitment and ordering;
- Technical agro-forestry-pastoral programme:
    - Use of new irrigated area
    - Use of pilot village / Theun Douane
        - Introduction of forages,
        - Introduction of market garden test varieties
        - Introduction of diverse annual staple and commercial crops
    - Nakai Neua nursery:
        - Introduction of fruit tree varieties
        - Introduction of stock seeds (citrus)
    - 42 hectares of family plantation forestry at PhonphanPek
        - Introduction of forage species
        - Establishment of forest-pastoral systems and soil management methods.
    - Drawdown: Testing of implantation of forage species able to survive frequent submersion (*Bracharia mutica*)
- Technical support mission for technical and woodland-pastoral programmes;
- Various programming support missions.

10. CONCLUSION

The blueprint presented in this document is a working tool that presents all actions that could be undertaken over the course of the NTPC technical assistance phase 2006-2012. It is also a technical and financial piloting tool. Emphasis essentially lies on the Agriculture/Livestock programme and its integration with the Forestry, Fisheries and Social programmes. This is necessary to avoid duplication and above all to develop the synergies required for all to function. This integration must also be adopted by the other programmes so that the pilot technical phase of the Project can be applied simultaneously.

The second half of 2006, from June to December, will be dedicated to implementing all prioritised technical activities but also to detailing programmes from 2007 to 2009. All of these proposals should be considered as alternative options to the programme defined in the SDP and CA. They are based on the same general and specific socio-economic and environmental

objectives. A third option, involving only economic, social and environmental development on the Forestry component, with special attention to the timber sub-component, has been discussed.

11. APPENDICES